BASi Raturn

INSTRUCTION MANUAL

The BASi Raturn uses a patented technology to maintain the integrity and patency of multiple sampling lines in an awake, freely moving animal. It consists of a turntable and drive mechanism connected to a control box.

1. Introduction

Specifications:

The Raturn System consists of a turntable and drive mechanism connected to a control box. The animal is tethered to a balance arm with a flag marker. As the animal moves left or right, the flag enters a sensor, which causes the cage to rotate in the opposite direction of the movement, keeping lines from tangling.

Features:

- **Patented, swivel-free technology for freely moving animals**
- **Fast and easy installation**
- **Tethers and caging available for multiple species**
- **Easy clean up between experiments**

Components:

The Raturn system is shipped in a single box.

- **Raturn Controller**
- **Base plate**
- **Raturn Platter**
- **Raturn Motor**
- **Upright arm with socket screws**
- **Balance arm and tether**
- **Power Cord**
- **Spare O-rings**
- **Replacement animal collars**
- **Two socket-head screws**
- **Two nuts**
- **Red hex screw driver**

2. Safety Precautions

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific **WARNINGS, CAUTIONS,** or **NOTES** elsewhere in this manual may impair the protection provided by the equipment. Such noncompliance would also violate safety standards of design, manufacture, and intended use of the instrument.

Bioanalytical Systems, Inc. assumes no liability for the customer's failure to comply with these requirements.

- For indoor use only.
- Ground the instrument. To avoid electric shock, the instrument must be grounded with the supplied power cable's grounding prong.
- Do NOT exceed the operating input power, voltage, current level and signal type appropriate for the instrument. Refer to the installation section for further information.
- Electrostatic discharge (ESD) can damage the highly sensitive microcircuits in your instrument. ESD damage is most likely to occur as the instruments are being connected or disconnected. Ground yourself to discharge any static charge built-up by touching the outer shell of any grounded instrument chassis before the I/O connectors are connected or disconnected.
- Do NOT place the instrument in fluid or expose the internal elements or back panel to fluid.
- Do NOT operate the instrument in an explosive atmosphere or in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment clearly constitutes a safety hazard.
- Keep away from live circuits. Operators must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltage levels may exist even with the power cable removed. To avoid injuries, always disconnect the power and discharge circuits before touching them.
- Do NOT substitute parts or modify the instrument. To avoid the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to the Bioanalytical Systems, Inc. service department for service and repair to ensure that safety features are maintained in operational condition.

If you notice any unusual conditions as listed below, immediately terminate operation and disconnect the power cable. Contact the Bioanalytical Systems, Inc. service department for repair of the instrument. If you continue to operate without repairing the instrument, there is a potential for hazard or damage to both the equipment and the operator.

- Instrument operates abnormally
- Instrument emits abnormal noise, smell, smoke or a sparks during operation
- Instrument generates high temperatures or electrical shock during operation
- Power cable, plug or receptacle on instrument is damaged
- Foreign substance or liquid has penetrated the outer cover of the instrument

Important Information:

Throughout the course of this manual, the following words and symbols will be used to designate important information:

WARNING – This signifies extreme hazard. Not following the instructions may result in serious injury or death.

CAUTION – Following information relates to a hazard. If instructions are not followed properly, it can result in irrevocable damage to the instrument.

NOTE – This implies that the following instructions are essential for the user to understand in order to operate the equipment effectively.

Symbols

Caution: Risk of danger. User's manual must be consulted in all cases where this symbol is marked.

Alternating current

Fuse

On (supply)

Off (supply)

Complies with European Union directives

The European Waste Electrical and Electronic Equipment (WEEE) Directive

Environmental Requirements

The Raturn is designed to operate under the following environmental conditions:

- Temperature: 10°C to 35°C
- Humidity: 15% to 50% (relative humidity)
- Pressure: 75 KPA – 106 KPA
- Altitude: < 2,000 meters
- Pollution Degree 2

CAUTION - The Raturn must be protected from temperature extremes that could cause condensation within the instrument.

3. Installation

3.1. Power Requirements

The Raturn requires a power source that meets the following specifications:

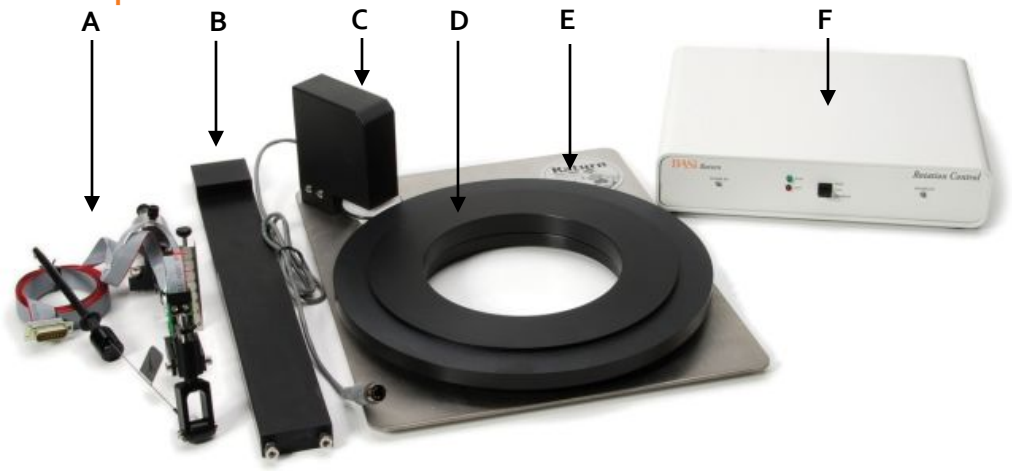
- Voltage: 100-240 VAC (auto select)
- Frequency: 50-60 Hz
- Power Consumption: VA (max)
- Connections: The power cable uses a three-wire system in accordance with international safety standards. When connected to an appropriate ac power outlet, this cable grounds the instrument frame.

WARNING - To protect against electrical shock, the power cable grounding prong must NOT be removed. Failure to comply with these requirements may result in injury to both the user and the equipment.

3.2. Computer

No computer is required for the proper functioning of the standalone BASi Raturn. However, BASi also offers an *Animal Activity Monitoring* program which can be connected to the Raturn and downloaded to most computers. More information is available in the *Animal Activity Monitor Instruction Manual.*

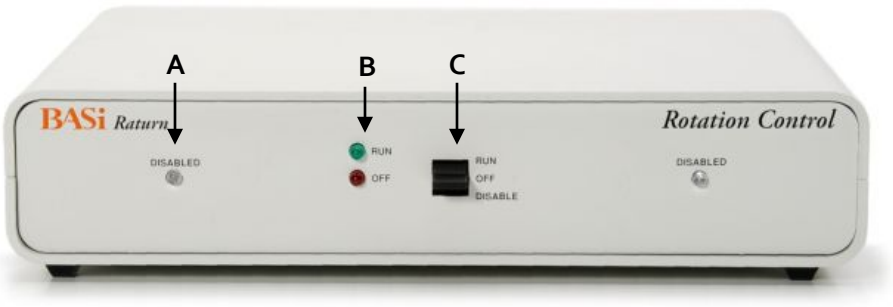
3.3 Raturn Components



A: Balance arm and tether
B: Upright arm (vertical support) with screws
C: Raturn motor
D: Raturn platter
E: Base plate
F: Raturn controller

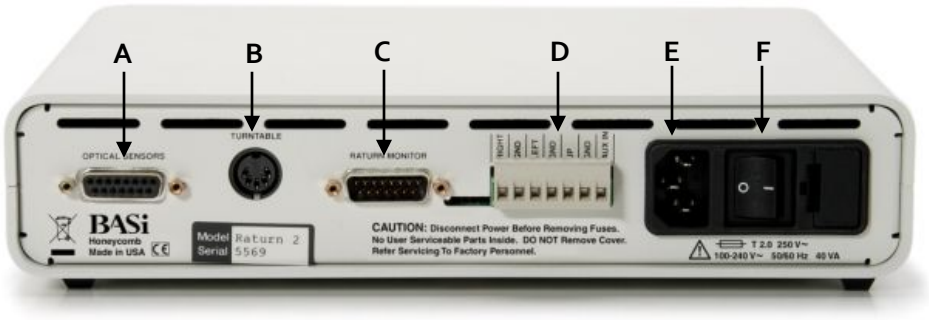
Raturn Controller Components

Front Panel:



A: Red flashing indicator lights for Raturn DISABLE
B: Red and green indicator lights for Raturn ON or OFF
C: Control switch for Raturn turntable activation

Back Panel:



A: Optical sensor plug port, for balance arm cable
B: Turntable plug port, for the Raturn motor
C: Raturn monitor port for animal activity cable (use only with Culex or Empis)
D: Outputs for animal activity monitoring
E: Plug port for power cable
F: Power switch

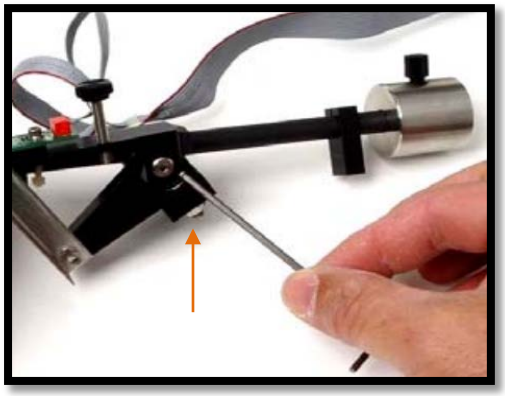
3.4 Assembly Instructions

The Raturn system should always be placed on a stable, level surface to ensure proper functioning. To install the Raturn, follow the instructions below.

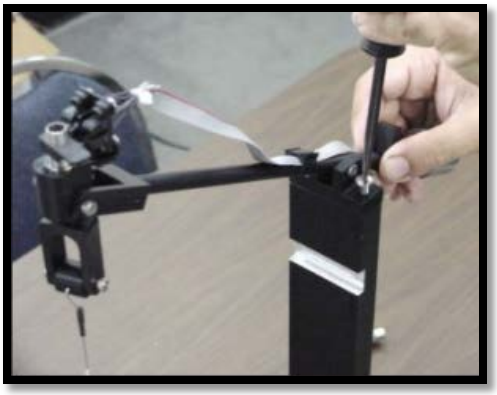
1. Attach the upright arm vertical support (part B) to the base plate (part E) using two socket head screws. Orient the notch in the upright arm facing to the inside, towards the base plate.

2. First, remove the **two** nuts holding the screws on the underside of the balance arm (see **arrow**). Then, use a hex key to remove the hex screw on the pivot point of the balance arm (part A). This will allow you to remove the rearing sensor assembly and expose the two screws underneath.

CAUTION: The balance arm will disengage from the mount. Be careful not to drop the arm.

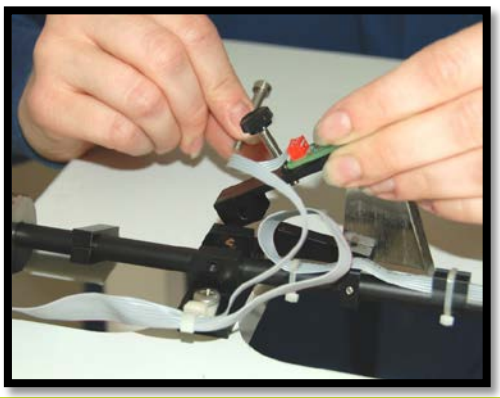


3. You will notice two screw holes at the top of the upright arm (part B). Attach the balance arm (part A) to the upright arm by using the two screws on the underside of the balance arm which have just been exposed in step 2. The screws will look slightly different from one another; the flathead screw should go under the rearing assembly.



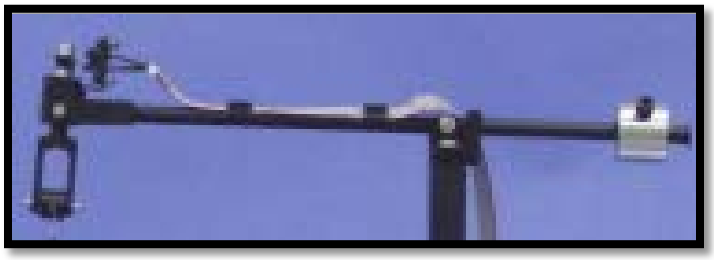
4. Now, replace the rearing assembly and secure it with the hex screw. Support the balance arm so that it stays in place during this procedure. The rearing tab on the balance arm must lie in the notch on the rearing sensor assembly; otherwise rearing will not be detected.

CAUTION: Make sure the balance arm is properly secured with the hex screw before letting go.



NOTE: The area around the balance arm should always be kept free of cables or wires. Never run anything behind, under, or around the arm where it could catch and interfere with the motion of the balance arm.

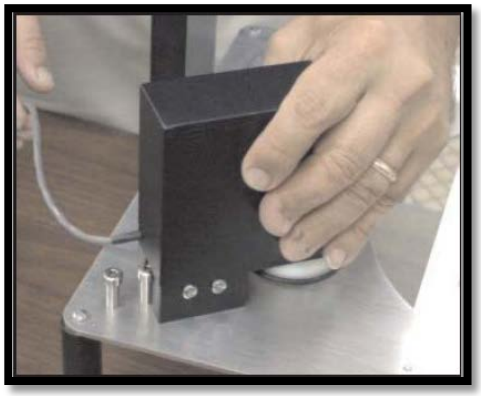
5. Slide the metal counterweight on the arm towards the back until the arm is balanced horizontally and twist black knob to tighten. Slide the black locking tab back until it contacts the counterweight. Check to see that the balance arm pivots freely up and down.



NOTE: To lock the balance arm in place, turn the black locking tab until it faces down and then slide it forward until it contacts the vertical support.

CAUTION: Before using the Raturn with a freely moving animal, **always unlock the balance arm** by sliding the locking tab back to allow the arm to move freely.

6. Slide the Raturn motor (part C) completely over the two shoulder screws located in the corner of the base plate (part E).



7. While pushing back on the Raturn motor (part C), set the Raturn platter (part D) into place so that the lip of the platter bearing rests on the base plate (part E). You should hear or feel the platter slot into place. Release the motor and check to make sure that the O-ring is sitting against the side of the platter.

CAUTION: Failure to ensure proper placement of the Raturn platter against the drive motor can result in improper turning of the platter.

8. Place the Raturn controller (part F) on a stable, level surface near the base plate (part E). Make sure that both the controller switch (front panel) and the power switch (back panel) of the Raturn controller are set to OFF. These controls are referenced on page 8 of this manual.

9. Plug the Raturn motor (part C) into the Raturn controller (part F)

10. Plug the sensor cable from the balance arm (part A) into the Raturn controller (part F).

11. Plug the power cable into the Raturn controller (part F).

12. Plug the Raturn controller (part F) into a properly grounded outlet

13. Turn the power switch on the Raturn controller (back panel) (part F) to ON. Turn the control switch of the Raturn controller (front panel) to ON (light will be green).

14. To check for proper functioning of the Raturn, adjust the black flag on the tether arm so that it is pointing directly forward and not contacting the sensor. Manually rotate the tether arm so that the flag contacts the sensor both clockwise and counterclockwise. The motor should activate and the turntable should rotate in the opposite direction from the tether arm.

NOTE: If the turntable fails to rotate properly, please see the Troubleshooting section of this manual.

CAUTION: When working with an animal which is already connected to the tether, always turn the Raturn controller to OFF or STANDBY and try to keep the animal still to prevent the collar from twisting. When finished, securely close the cage door and then turn the Raturn controller (front panel) to ON and watch to make sure animal can move freely.

4. Using the Raturn

4.1 Assembling the Universal Culex Cage

1. Please refer to the Universal cage instruction Manual for proper assembly of the universal cage with the proper floor height for your desired species (rat, mouse)
2. The tether should be appropriate for the species type and be balanced in such a way that the end of the tether (the part that connects to the collar) lies at the level approximately where the animals head will be.

4.2 Collaring an Awake Animal

1. Form a loop with the collar and tighten it a few notches.

CAUTION: Make sure that the collar is looped so that the collar lock is facing toward the outside of the collar.

2. Slide the collar over the animal's head. Tighten until the collar is tight enough when it is snug against your pinky finger.

3. Clip the excess length of collar with a pair of small wire clippers or scissors. Leave only a few links so that you have a place to grip if it becomes necessary to tighten the collar later.

4. The animal is now ready to be hooked to the Raturn.

4.3 Hooking an Animal to the Raturn

1. Press down on the top of the black tether to extend the metal hook.

2. For rats, slide the hook around the collar at the back of the neck. A central "tooth" in the metal hook should slide into one of the openings of the collar to properly secure it. For mice, you will only need to slide the single hook around the collar at the back of the neck as there is no central tooth for the mouse tether. Release the tether to retract the hook and secure the animal, making sure not to pinch the skin upon release.

CAUTION: The tether should **NEVER** be hooked to the part of the collar that extends beyond the collar lock. This can cause the collar to tighten over time and the animal to strangle. Always hook the tether to a central point in the collar.

NOTE: It is helpful to orient the collar so that the collar lock rests behind the head. This will prevent the animal from catching a paw in the lock while grooming or becoming uncomfortable when they are trying to sleep.

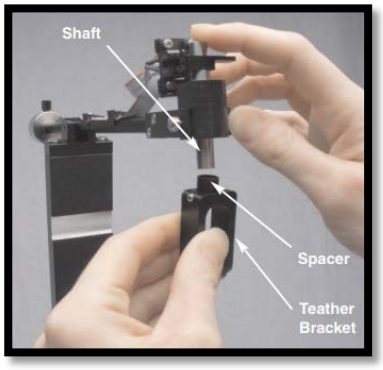
4.4 Running the Raturn

1. Once an animal is properly secured, set the tab on the front of the Raturn controller to the ON position. When the controller is on, the green indicator light will be lit, and the Raturn platter will rotate in response to the animal's movement.

CAUTION: Always leave the Raturn on when an animal is collared and unsupervised. Failure to power on the Raturn controller can cause an animal to strangle.

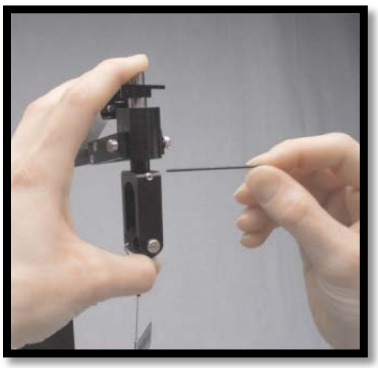
2. There are two types of "OFF" settings for the Raturn controller – OFF and DISABLE. Both settings will turn the Raturn platter off. When set to OFF, the red indicator light will be lit. When set to DISABLE, the two red indicator lights on the left and right of the controller will flash. This is designed as a reminder to the user to turn the Raturn controller back on before leaving a tethered animal on the system.

4.5 Changing the tether



To switch from a rat or mouse tether or vice versa, follow the directions below.

1. Use the 1/16" hex key provided to loosen the set screw in the side of the tether bracket.



2. Slide the old tether bracket off of the metal tubing shaft, being careful not to lose the plastic spacer just above the tether bracket. Slide the replacement tether bracket on to the metal tubing shaft and compress slightly using downward pressure on the shaft and upward pressure on the tether bracket. Using the 1/16" hex key, tighten the set screw.

5. Maintenance

5.1 Cleaning and Care

Proper care and cleaning are essential to the longevity of the Raturn system. Keeping the Raturn clean will circumvent most problems that the user may experience.

After each use:

Disassemble the platter and motor. The platter may be washed in a standard laboratory washer, or by hand. The motor, Raturn controller, base plate and tether should be wiped down with a standard laboratory disinfectant.

WARNING: Do not submerge the Raturn motor, controller, or balance arm/tether. Do not allow liquid to enter the back panel of the Raturn controller. This can pose an electrocution hazard.

Maintenance:

Every three months, check the O-ring on the motor. If the O-ring is cracked, dry, or worn, replace it. To replace the O-ring, simply use your fingers to peel the old ring off of the wheel on the motor. The new ring may then be slipped into place. **NOTE:** O-rings may need to be replaced more or less frequently depending on laboratory conditions and instrument use. Regular checking and maintenance will prevent problems.

5.2 Replacement Parts from BASi:

Main Components

A-1845: Metal flag for wire tether

MD-1455R: Tether line with mounting bracket, wire, flags, and collar lock

MD-1550: Counter balanced sensor arm

MW-1502: Raturn sensor assembly with tether

MW-1503: Raturn turntable assembly (base plate and platter)

MF-2050: Ozone resistant O-rings

Accessory Components:

MD-1460R: Mouse tether line with mounting bracket, wire, flags and collar lock

CX-1214: Mouse tether for use with dual-species cage

MF-5371: Replacement rat collars

MD-1365: Replacement mouse collars

6. Troubleshooting Guide

6.1 Problems You May Encounter

Problem: The motor runs, but the turntable is not turning, or turning slowly.

1. Check the position of the turntable. Make sure that it is seated properly, and the wheel of the motor is fully contacting the side of the turntable.
2. Check the condition of the O-ring. If it is cracked or worn down, replace it.

Problem: The turntable does not turn at all when the flag contacts the sensor

1. Check to make sure that the Raturn controller is on (green light)
2. Check that the cable from the balance arm to the controller is fully plugged in, and that none of the pins are bent.
3. If both of these things are okay, please call BASi service.

Problem: the turntable only turns in one direction

1. Make sure the cable from the balance arm to the controller is fully plugged in, and that none of the pins are bent.
2. If the cable is properly secured, please call BASi service.

Problem: The balance arm does not have full range of movement

1. Check for obstructions around the back of the arm, such as wires, cables, etc.
2. Make sure the lock on the balance arm is disengaged.
3. Check that the balance arm is properly secured into the mount with the hex screw, and pivots on the screw.

Problem: The animal will not allow me to tether it

1. Turn off or disable raturn.
2. Inside the cage, hold the animal by the base of the tail with one hand, and then grab ahold of the end of the collar where it has been cut to steady the animal. While holding the end of the collar, remove hand from tail and gentle attach the collar at the back of the neck being careful not to pinch the skin or hair.
3. Release animal and turn raturn back on.

Problem: There was damage during shipping

Orders are normally shipped prepaid via a ground service and charges include an insurance fee to cover loss or damage in transit. If you do not wish to pay for shipping insurance, your order must also include

a waiver saying that you take full responsibility for any damage or loss incurred on the item once it leaves our dock. Claims on insured items must be made within 30 days of the ship date.

1. For items shipped with insurance, please contact BASi order entry (800-845-4246 or 765-463-4527) for assistance.
2. Have the model and serial number of the damaged instrument available
3. Save the box and all packaging materials that accompanied the item for return shipment to BASi
4. You will be given a Return Authorization Number (RA#). This number must be placed on all labels and documents accompanying the returned product.

6.2 Contact BASi

For questions about basic operations of this instrument, or in case of equipment failure, please contact BASi and ask for Culex product support. For instruments that are out of warranty and not covered under a service plan, a cost estimate for repair will be provided.

Bioanalytical Systems, Inc. (BASi)
2701 Kent Ave
West Lafayette, IN 47906
TEL: (800) 845-4246
FAX: (765) 497-1102
EMAIL: invivo@bioanalytical.com

6.3 Limited Warranty

BASi warrants equipment manufactured by the company to be free of defects in material and workmanship for a period of one year from the date of shipment, except as provided hereinafter. This assumes normal usage under commonly accepted operating parameters and excludes consumable products.

BASi agrees either to repair or replace, at its sole option and free of part charges to the buyer, any parts of such instrumentation which, under proper and normal conditions of use, prove to be defective within 90 days from the date of shipment. This warranty and remedy are given expressly and in lieu of all other warranties, expressed or implied, of merchantability or fitness for a particular purpose and constitutes the only warranty made by BASi.

BASi neither assumes nor authorizes any person to assume for it any other liability in connection with the sale, installation, service or use of its instrumentation. BASi shall have no liability whatsoever for special, consequential, or punitive damages of any kind from any cause arising out of the sale, installation, service or use of its instrumentation.

All products manufactured by BASi are tested and inspected prior to shipment. Upon prompt notification by the Buyer, BASi will correct any defect in warranted equipment of its manufacture either, at its option, by return of the item to the factory, or shipment of a repaired or replacement part. BASi will not be obliged, however, to replace or repair any piece of equipment which has been abused,

improperly installed, altered, damaged, or repaired by others. Defects in equipment do not include decomposition, wear, or damage by chemical action or corrosion, or damage incurred during shipment.

Limited Obligations Covered by this Warranty

1. In the case of instruments not of BASi manufacture, the original manufacturer's warranty applies.
2. Shipping charges under warranty are covered only in one direction. The buyer is responsible for shipping charges to the factory if return of the part is required.
3. This warranty does not cover damage to valves, lamps, seals, or columns due to improper installation by the buyer.
4. Thin-layer amperometric cells and working electrodes are limited to 60 days.
5. Warranty for valves is limited to 30 days.
6. Expendable items, including but not limited to microdialysis probes, reference electrodes, chemical standards, prepared solutions, lights, fuses, O-rings, gaskets, glass items, membranes and filters, are excluded from warranty.
7. Failure by the customer to perform normal and reasonable maintenance on instruments will void warranty claims.
8. If the original invoice for the instrument is issued to a company which is not the company of the end user, and not an authorized BASi distributor, then all requests for warranty must be processed through the company which sold the product to the end user, and not through BASi or its distributors.